## **Session 5B:** Monitoring our Source Waters and SDWA/CWA Integration March 19, 2008

EPA's Experimental Stream Facility: Design and Research Christopher T. Nietch, PhD

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The Experimental Stream Facility (ESF) represents an invaluable tool in research that is underway to better our understanding of the relative importance of small stream ecosystems and the services they provide for effective watershed management. Concurrent work relies on ESF studies designed to characterize how streams and rivers in general, react to and process emerging contaminants and stressful mixtures. The ESF set-up balances controlled laboratory conditions and the natural variability that is characteristic of stream ecosystems. Fully automated, continuous flows of river water are delivered to eight, 12 m long model stream channels (mesocosms). Chemical contaminants and/or treated sewage effluent can be precisely supplied and mixed in desired proportions for each channel. Extrinsic and intrinsic stream characteristics such as light intensity and streambed substrate type, respectively, can be manipulated within and across studies to research how pollutant loads interact with important characteristics of stream habitat. Each ESF study provides information on ecosystem structure and function that can be used in relation to the development and testing of new indicators of ecological stress, water quality monitoring technologies, and water quality management methods and models. In 2005, standard operating procedures to define base analytical endpoints for each ESF study were developed during preliminary runs that manipulated stream flow regime as a treatment effect. In 2006, collaborative research began with a dosing experiment that validated bivalve behavioral monitoring as an early warning to potential cascading ecosystem-level effects of copper pollution. Additionally, two screening studies were conducted with EE2 and Trenbolone (an estrogen and androgen-based endocrine disrupting compound, respectively), In 2007, a study focusing on interactions between incident irradiance and simulated lawn fertilizer runoff was run in the spring and one focusing on the effects of tetracycline (general use antibiotic) on stream ecosystem function was conducted from summer to early fall.

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